MICROELECTRONICS

B.E., VI Semester, Electronics & Communication Engineering/ Telecommunication Engineering

[As per Choice Based Credit System (CBCS) scheme]

Subject Code	15EC655	IA Marks	20
Number of Lecture Hours/Week	03	Exam Marks	80
Total Number of Lecture Hours	40 (8 Hours / Module)	Exam Hours	03

CREDITS – 03

Course Objectives: This course will enable students to:

- Be familiar with the MOSFET physical structure and operation, terminal characteristics, circuit models and basic circuit applications.
- Confront integrated device and/or circuit design problems, identify the design issues, and develop solutions.
- Analyze and design microelectronic circuits for linear amplifier and digital applications.
- Contrast the input/output and gain characteristics of single-transistor, differential and common two-transistor linear amplifier building block stages.

Module-1	RBT Level
MOSFETS: Device Structure and Physical Operation, V-I Characteristics, MOSFET Circuits at DC, MOSFET as an amplifier and as a switch.	L1, L2
Module-2	
MOSFETS (continued): Biasing in MOS amplifier Circuits, Small Signal Operation and Models, Basic MOSFET amplifier, MOSFET internal capacitances, frequency response of CS amplifier.	L1, L2
Module-3	
MOSFETS (continued): Discrete circuit MOS amplifiers. **Single Stage IC Amplifier:** Comparison of MOSFET and BJT, Current sources, Current mirrors and Current steering circuits, high frequency response- general considerations.	L1, L2, L3
Module-4	
Single Stage IC Amplifier (continued):CS with active loads, high frequency response of CS, CG amplifiers with active loads, high frequency response of CG, Cascode amplifiers. CS with source degeneration (only MOS amplifiers to be dealt).	L1, L2
Module-5	
Differential and Multistage Amplifiers: The MOS differential pair, small signal operation of MOS differential pair, Differential amplifier with active loads, and frequency response of the differential amplifiers. Multistage amplifiers (only MOS amplifiers to be dealt).	L1, L2
Course outcomes: After studying this course, students will be able to: • Explain the underlying physics and principles of operation of Metaloxide-semiconductor (MOS) capacitors and MOS field effect transistors (MOSFETs). • Describe and apply simple large signal circuit models for MOSFETs. • Analyze and design microelectronic circuits for linear amplifier for digital applications.	

• Use of discrete MOS circuits to design Single stage and Multistage amplifiers to meet stated operating specifications.	

Question paper pattern:

- The question paper will have ten questions
- Each full question consists of 16 marks.
- There will be 2 full questions (with a maximum of Three sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Text Book:

"Microelectronic Circuits", Adel Sedra and K.C. Smith, 6th Edition, Oxford University Press, International Version, 2009.

Reference Books:

1. **"Microelectronics An integrated approach",** Roger T Howe, Charles G Sodini, Pearson education.
2. **"Fundamentals of Microelectronics",** Behzad Razavi, John Wiley India Pvt. Ltd, 2008.
3. **"Microelectronics – Analysis and Design",** Sundaram Natarajan, Tata McGraw-Hill, 2007.

D.V.

H.O.D.

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